APPENDIX H

TEMPERATURE PROFILE TRIP REPORT/ PIEZOMETER DATA
(Provided on CD)

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January 27, 2011

Mr. Steve Morrow
Olin Corporation
3855 Ocoee Street N; Suite 200
Cleveland, TN 37312-4441

Subject: **Trip Report – Operable Unit 2**
Temperature Profile: Landfill Brook and Maple Meadow Brook Wetlands
Olin Chemical Superfund Site
51 Eames Street
Wilmington, Massachusetts

Dear Mr. Morrow:

A surface water temperature profile was conducted on the reach of Landfill Brook that occurs on the Town of Woburn Landfill Property on November 4, 2010. In addition, surface water temperature profiling was conducted in the Maple Meadow Brook Wetland (which includes Maple Meadow Brook and Sawmill Brook) on November 15 and 16, 2010. The location and cultural features surrounding Landfill Brook are shown on Figure 1. The setting of Maple Meadow Brook and Sawmill Brook is shown on Figure 2. The work was conducted in accordance with section 5.1.2 of the Field Sampling Plan contained in the USEPA-approved Olin Chemical Superfund Site RI/FS Work Plan dated August 14, 2009. The purpose of the surface water temperature profiling was to identify potential point discharge locations of groundwater along the reaches of the brooks surveyed. The work plan proposed that the results of the temperature profiling be used to adjust proposed surface water and sediment sample locations, by re-locating them to coincide with groundwater discharge areas, should they be identified. This trip report documents the survey measurement locations, the weather conditions at the time of the survey, measurement methodology, results, observations, and recommendations. Based on the results of this study, no groundwater point discharge locations were identified for Maple Meadow Brook, Saw Mill Brook or Landfill Brook. No changes are proposed for sampling locations for the Maple Meadow Brook or Saw Mill Brook. With respect to the Landfill Brook, no location adjustments are proposed due to the temperature survey results. There are two locations that are proposed for relocation due to access considerations and identified site features.

Survey Location

The temperature profiling was conducted along an approximately 1,750 foot reach of the Landfill Brook, which is shown in Figure 1. This figure also shows the original surface water and sediment sampling locations proposed in the RI/FS Work Plan. Revised locations are shown on a subsequent figure after discussion of the results. Properties where access could not be obtained were not profiled. Those properties included the stream channel that occurs within the NSTAR right-of-way and the portion of the Landfill Brook downstream of the Woburn Landfill property. In addition measurements could not be collected in wetland areas where there was no defined channel present (i.e., between sample station 12+00 and 14+30 shown on Figures 3 and 5). Exclusion of these areas does not materially affect the results of the temperature survey. The brook ranged from 6 to 10 feet in width and the depth of water ranged from approximately 6 inches to 1 foot. The stream bottom substrate was composed mostly of unconsolidated muck sediment. Representative photographs of the brook are provided in Attachment 1.

Temperature profiles along Maple Meadow Brook and Sawmill Brook in the Town of Wilmington, MA were conducted on November 15th and 16th, 2010. The temperature profile was started on Maple Meadow Brook where the former Middlesex Canal crosses the brook and continued approximately 1,830 feet upstream. The temperature profile on Sawmill Brook started at the intersection with Maple Meadow Brook and continued upstream approximately 2,230 feet. The portions of these two brooks where the temperature profile survey was conducted are shown on Figures 2 and 4. Figure 2 also shows the original surface water and sediment sampling locations proposed in the RI/FS Work Plan. The portions of the brooks surveyed ranged in width from a few feet to 15 feet. There were also segments where the brook channel becomes indistinct and indiscernible within emergent and scrub shrub vegetation that dominates the wetland. The depth of water ranged from approximately 6 inches to 4 feet. The bottom substrate was composed primarily of unconsolidated, decaying, organic material. Representative photographs of the Maple Meadow and Sawmill Brook survey are also presented in Attachment 1.

Prevailing Weather Conditions

The weather at the time of the Landfill Brook survey was overcast with a light rain falling. The air temperature at the beginning of the survey was 10.2 degrees Celsius (C°) and at the end was 9.1 C°. Air temperatures were measured with a Horiba U-10 Water Quality Meter. A light rain started at approximately 0830 and continued throughout the survey and became steady by the time the survey was

completed. During the entire day of temperature profiling approximately 0.38 inches of rainfall was recorded at a nearby weather station in Wilmington, MA. The rain event was not of sufficient duration or intensity to promote overland flow into the brook or cause a noticeable increase in flow during the survey event. Based on these observations, the data collected is suitable for its intended purpose of detecting changes in stream temperature that might be indicative of groundwater discharge.

The weather on the first day of Maple Meadow Brook and Sawmill Brook temperature profiling was overcast with a slight wind but no rain. The air temperature at the beginning of the survey was 11.5 C° and at the end was 9.1 C°. Survey field work on the first day started at approximately 1100 and ended at 1430. The weather on the second day of temperature profiling was similar to the first day, although there was a light rain in the morning which dissipated before field activities began. The air temperature at the beginning of the second day of survey was 10.0 C° and at the end was 10.9 C°. Survey field work was conducted from 0930 to 1600 on the second day.

Temperature Measurements and Observations

Figures 3 and 4 show the station locations and the measured water temperatures, in degrees Celsius, for the Landfill Brook, Maple Meadow Brook and Sawmill Brook, respectively. The temperature was measured using a Horiba U-10 Water Quality Meter. The temperature probe was attached to a ski pole with the temperature sensor set at 6 inches above bottom of the disk to provide a uniform measurement distance from the stream bottom. At each location the pole was set in the bottom of the stream so the disc was resting on the bottom, the meter was allowed to equilibrate, and the measurement was recorded. The temperature was measured approximately every 50 feet along the reach of the brook that was surveyed. All of the temperature probe locations were located using a TRIMBLE Geo XH Global Positioning System.

The measured Landfill Brook surface water temperature ranged from 5.7 C° to 8.8 C°. Based on recent groundwater sampling, the expected average groundwater temperature in the area is approximately 11 to 12 C°. The temperature measurements in the stream showed a slight increase moving upstream in the brook with the highest temperature (8.8 C°) being measured at the upstream end of the survey. The higher temperatures correlate with an area of slower moving water and are within an emergent palustrine wetland. The lower temperatures measured in the brook correlated with the faster moving shallower areas of the brook. No notable temperature spikes or anomalous areas of elevated temperature were observed

which would represent concentrated point discharges of groundwater (springs) along the reach of the brook surveyed.

As shown in Figure 4, temperatures recorded in both Sawmill Brook and Maple Meadow Brook increased progressively and steadily in the upstream direction. Temperatures in Sawmill Brook ranged from 6.8°C to 10.3°C and temperatures along Maple Meadow Brook ranged from 6.8°C to 12.2°C. Air temperatures ranged from 8.9°C to 14°C depending on the time and day of the observed measurements. Based on recent groundwater sampling, the expected average groundwater temperature in the area ranges from 9°C to 11°C. No notable temperature spikes or anomalous areas of elevated temperature were observed which would represent concentrated point discharges of groundwater (springs) along the reach of the brooks surveyed.

Recommendations

The temperature profiling along Landfill Brook, Maple Meadow Brook and Sawmill Brook did not identify any temperature anomalies that would indicate localized points of groundwater discharge which would require adjustment of the previously proposed surface water and sediment sample locations. Therefore there are no proposed changes to sample locations within Maple Meadow Brook and Sawmill Brook which are shown on Figure 2 and on Figure 5.1-3 of the August 14, 2009 RI/FS Work Plan. These sample locations will provide suitable data to assess surface water and sediment quality within Maple Meadow Brook and Sawmill Brook.

Based on observed conditions and property access considerations along Landfill Brook, it is recommended that two of Landfill Brook proposed sampling locations (shown in Figure 1 and Figure 5.1-2 of the August 14, 2009 RI/FS Work Plan) be adjusted. The most downstream surface water/sediment location (LB-SD/SW3) would be moved upstream to an alternate location on property owned by the Town of Woburn to provide a sample location on a property for which an access agreement exists. The mid-point stream sample location (LB-SD/SW2) would also be adjusted by moving it upstream to a point above manmade structures that were noted between stations 14+80 and 15+30 during the temperature profiling. The headwater stream location (LB-SD/SW1) would remain unchanged. These final, adjusted sample locations are shown on Figure 5 and will provide suitable locations to assess surface water and sediment quality within Landfill Brook.

In addition, in accordance with the approved RI/FS Work Plan, three drive point piezometers will be installed during surface water sediment sampling to evaluate shallow groundwater /surface water gradients in Maple Meadow Brook and Sawmill Brook. The piezometers will be installed by hand at surface water sediment sample locations near the midpoints of Maple Meadow Brook (MMB-SW/SD-3) and Sawmill Brook (MMB-SW/SD-5) and also down gradient (MMB-SW/SD-1) as shown on Figure 2.

Please feel free to contact me at (207) 828-3490 if you have any questions or comments.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

Peter H. Thompson
Project Manager

Leah Jones (for MJM with permission)
Michael J. Murphy
Project Principal

cc: MACTEC File - 6107110016

ATTACHMENT 1
PHOTOGRAPHS

Photo 1: Landfill Brook – Typical stream channel lower survey area.

Photo 2: Landfill Brook – Typical stream channel middle of survey area.

Photo 3: Landfill Brook – Palustrine emergent marsh at upper end of survey.

Photo 4: Maple Meadow Brook – At beginning of temperature survey.

Photo 5: Sawmill Brook – Upper section of brook.

Photo 6: Maple Meadow Brook – Lower section within button bush scrub shrub wetland, where no channel is evident.

Photo 7: Sawmill Brook – Section just above button bush scrub shrub wetland.

Photo 8: Maple Meadow Brook – Typical open channel.

Photo 9: Sawmill Brook – Upper Section.

Photo 10: Sawmill Brook – Upper reach section at end of survey.

FIGURES

Legend

- Proposed Sediment and Surface Water Location from RI/FS WP
- No agreement with property owner
- 4-1-7 Map-Block-Lot Number
- Approxamate Property Lines
- Railroad
- Paved Road
- Unpaved Road
- Sidewalks
- Surface Water
- Trails
- Wetland Symbol
- Wetland Boundary
- 51 Eames St. Property Boundary

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Wakefield, MA 01880

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Figure 1
Landfill Brook Overview

Trip Report – Operable Unit 2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared by BJR | Checked by PHT

Document: P:\OLIN\Wilmington\GIS\MapDocuments\RI Field Work\LandfillBrook_11X17_LS.mxd PDF: P:\OLIN\Wilmington\GIS\Figures\Temperature Profile\Figure 1- Landfill Brook Overview.pdf 12/14/2010 9:34 AM bjroden

Legend

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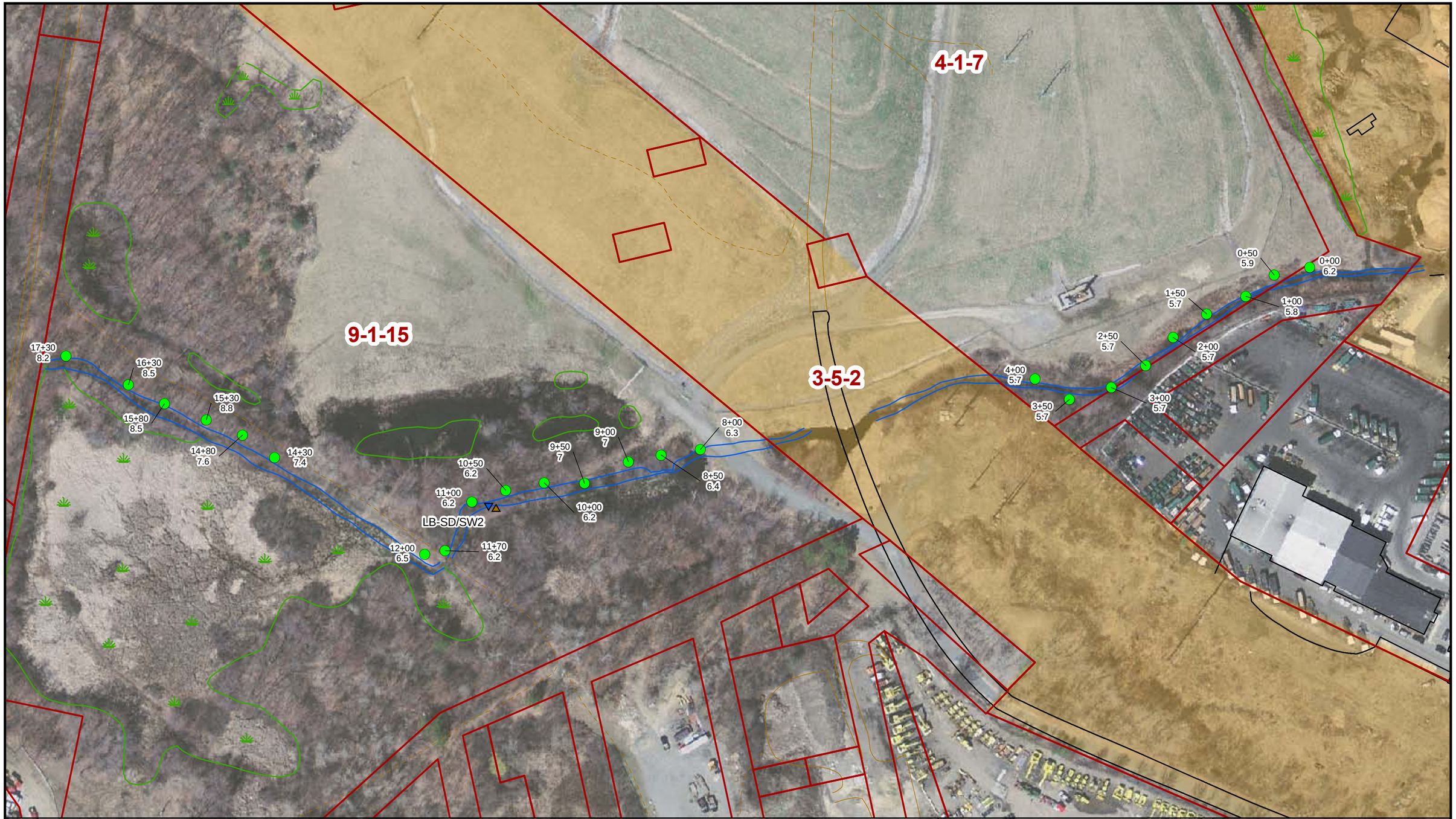
Figure 2
Maple Meadow Brook and Sawmill Brook Overview

Trip Report – Operable Unit 2
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared by BJR | Checked by PHT

Document: P:\OLIN\Wilmington\GIS\MapDocuments\RI Field Work\LandfillBrook_11X17_LS.mxd PDF: P:\OLIN\Wilmington\GIS\Figures\Temperature Profile\Figure 2- Maple Meadow Brook and Sawmill Brook Overview.pdf 12/14/2010 9:46 AM bjroden



Legend

- Proposed Sediment and Surface Water Location from RI/FS WP
- Temperature Profile Location
- No agreement with property owner
- 4-1-7 Map-Block-Lot Number
- 7.2 - Temperature degrees Celsius
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Figure 3
Landfill Brook Temperature Profile Data

Trip Report – Operable Unit 2
Olin Chemical Superfund Site
Wilmington, Massachusetts

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Legend

- Temperature Profile Location
- 7.2 - Temperature degrees Celsius
- Proposed Sediment and Surface Water Location from RI/FS WP
- Railroad
- Paved Road
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Figure 4
Maple Meadow Brook and Sawmill Brook Temperature Profile Data

Trip Report – Operable Unit 2
Olin Chemical Superfund Site
Wilmington, Massachusetts

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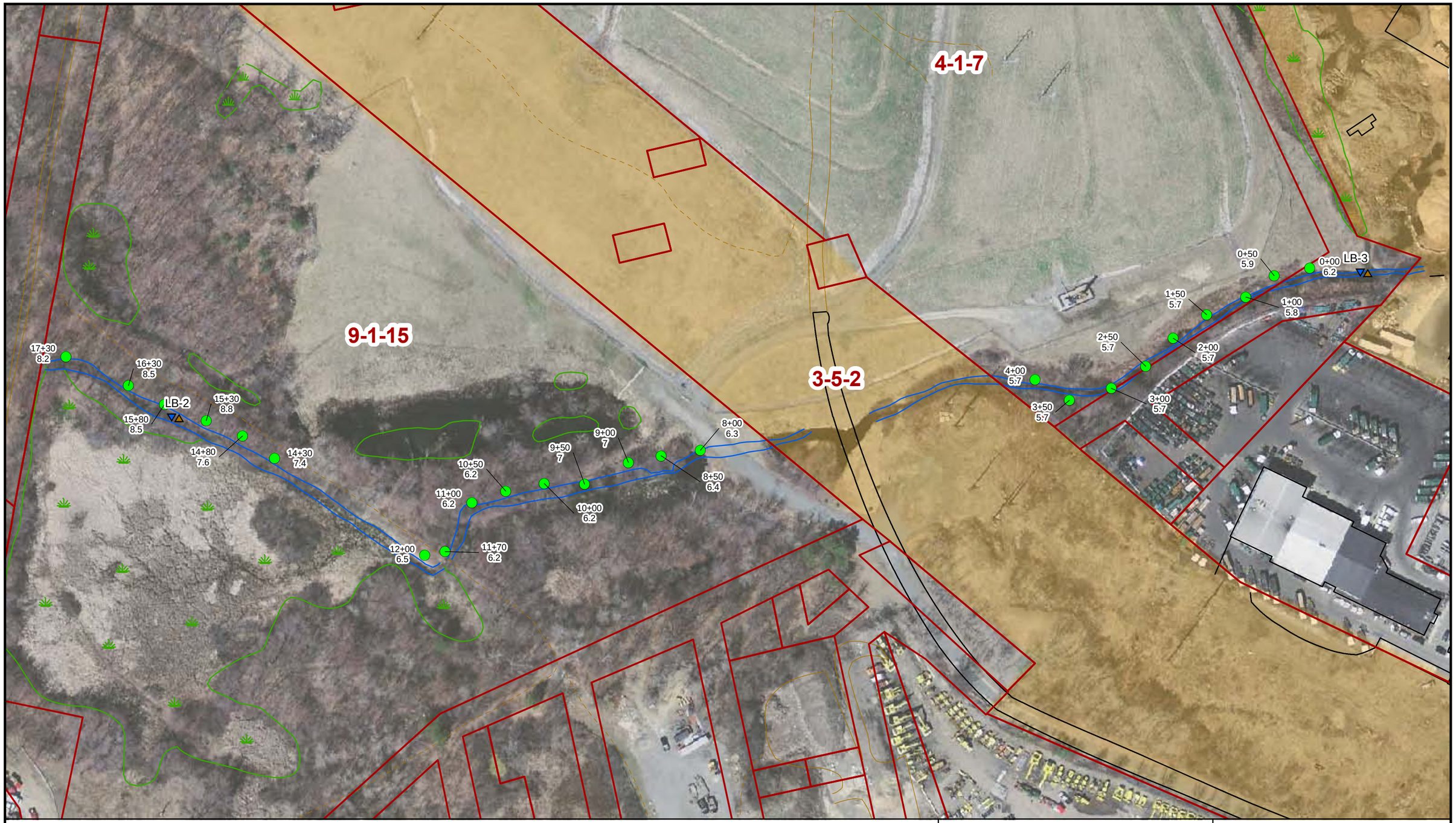
Document: P:\OLIN\Wilmington\GIS\MapDocuments\RI Field Work\LandfillBrook_11X17_LS.mxd PDF: P:\OLIN\Wilmington\GIS\Figures\Temperature Profile\Figure 4 - Maple Meadow Brook and Sawmill Brook Temperature Profile Data.pdf 12/14/2010 9:55 AM bjroden



Legend

- Proposed Sediment and Surface Water Location based on temperature profile
- Temperature Profile Location
- No agreement with property owner
- **4-1-7** Map-Block-Lot Number
- 7.2 - Temperature degrees Celsius
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Figure 5
Proposed Revised Landfill Brook Surface Water/Sediment Sample Locations - OU2

Trip Report – Operable Unit 2
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Document: P:\OLIN\Wilmington\GIS\MapDocuments\RI Field Work\LandfillBrook_11X17_LS.mxd PDF: P:\OLIN\Wilmington\GIS\Figures\Temperature Profile\Figure 5 - Proposed Revised Landfill Brook Surface Water Sediment Sample Locations.pdf 01/17/2011 10:15 AM bjroden

PIEZOMETER DATA

Legend

- Piezometer Location
- Proposed Sediment and Surface Water Location from RI/FS WP
- No agreement with property owner
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- Unpaved Road
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Figure 1
Maple Meadow Brook and
Sawmill Brook Piezometer Locations

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Document: P:\OLIN\Wilmington\GIS\MapDocuments\RI Field Work\LandfillBrook_11X17_LS.mxd PDF: P:\OLIN\Wilmington\GIS\Figures\RI Field Work\Figure 1 - Maple Meadow Brook and Sawmill Brook Piezometer Locations.pdf 03/03/2011 10:31 AM bjroden

Piezometer Water Level Measurements
Remedial Investigation Report - OU1 and OU2
Olin Chemical Superfund Site
Wilmington, Massachusetts

			December 2010 OU-2 Sampling		May 2011 Synoptic Round	Spring 2011 OU-2 Sampling			Fall 2011 Synoptic Round
		Date	12/2/2010	12/3/2011	5/10/2011	6/6/2011	6/7/2011	6/8/2011	10/10/2011
Confluence MMB & SMB	Piezometer #1	PZ-SW-1 in	3.87	-	3.65	3.83	-	-	2.75
		PZ-SW-1 out	3.88	-	3.71	3.85	-	-	2.82
Sawmill Brook (SMB)	Piezometer #2	PZ-SW-5 in	6.03	-	2.15	-	2.40	-	1.28
		PZ-SW-5 out	2.35	-	2.30	-	2.42	-	1.43
Maple Meadow Brook (MMB)	Piezometer #3	PZ-SW-3 in	-	5.94	-	-	-	4.27	3.19
		PZ-SW-3 out	-	4.25	-	-	-	4.29	3.28

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